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$$\frac{P}{27^{d}\cdot 32166116}=\left(\frac{1047\cdot 55}{327214}\right)^{\frac{1}{2}}\left(\frac{5\cdot 2028\times 92796950\times \sin 48''\cdot 05}{238854\cdot 75}\right)^{\frac{3}{2}}$$

$$=0\cdot 5002246 \text{ days}$$

$$=12^{h}\ 0^{m}\ 13^{s}\cdot 4.$$

An error of even $\frac{1}{20}$th of a second of arc in the assumed distance 48″·05 makes an appreciable difference in the resulting period. The best way of obtaining the true result is to infer it from the number of revolutions and parts of a revolution made by the satellite between the times of two distant elongations, as has now been done by Mr. A. Marth and Professor Barnard, whose periods thereby derived agree within half a second of time. The period found by Mr. Marth is $11^{h}\ 57^{m}\cdot 33$.

1892 *November* 15.

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## *Enlarged Star and Moon Photographs.* By H. C. Russell, B.A., F.R.S.

In making another enlargement of the photograph of the stars and nebulæ about *η Argûs* to replace the one destroyed in transit, it seems desirable to make it upon the same scale as Herschel's beautiful picture of that object published in the Cape observations, thus ensuring convenient comparison. This involved enlarging the original photograph, the scale of which is 2·3 ins. to 1°, up to 15 ins. to 1°, and the result is a strong testimony to the quality of the original negative. I have sent both positive and negative on paper. The paper negative of course involved making a positive by contact printing, in which much detail is lost. A comparison of these photographic enlargements with Herschel's drawing is very suggestive, both in regard to the difference in delineation and extent of the nebula by the eye and the sensitive plate, particularly in the great mass of detail which the camera brings out in the denser parts, and also the vastly greater number of stars, probably ten times as many in the photograph as in the drawing. (The original negative was exposed 5¾ hours.) I send also an enlargement of the same object (*η Argûs*) from a negative taken with a 6-inch diameter Dallmeyer portrait lens, and 8 hours exposure, on a scale of 0·556 in. = 1°, enlarged to 3 ins. = 1°. This enormously extends the area of the nebula, and shows that the dark markings which begin at the centre of the mass extend in curiously meandering lines to great distances, in several places enclosing nearly circular spaces. Looking at this photograph the nebula seems to spread out almost without limit, as indicated by the dark lanes which bring it into prominence; but the more definite parts, about which the connection with the central mass cannot be doubted, cover a space measured by 2° in R.A. and 3° in Decl., while the photograph taken with the star camera and 5¾ hours'

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exposure is less than 1° in R.A. and less than $1\frac{1}{4}$° in Decl., an area as nearly as possible of 1°; while in the one taken with the portrait camera it covers an area of at least 6°.

The photograph must speak for itself, but there is one feature of special interest. Herschel's lemniscate—at least the greater part of it—seems quite black to the eye aided by large telescopes, and the same in the photograph with the star camera, but it will be seen that in the one with the portrait camera it is not without nebulous light, and the prolonged exposure has brought it out sufficiently to fill up the dark space completely, while the dark oval which Herschel describes so carefully at R.A. – 100 and Decl. + 900 of his drawing is in the photograph absolutely dark, and thrown into great prominence by the brilliance of the nebulous light around it. I have also sent two enlargements of portions of the Moon, one showing *Copernicus* nearly 1 inch in diameter (scale for whole Moon 34 ins.), with corresponding detail inside and outside the crater; this is from a negative taken direct, $5\frac{1}{2}$ ins. in diameter: also a portion of the Apennine mountains, on a scale of 65 ins. = diameter of the Moon. The negative for this was taken direct on a scale of 20 ins. to diameter of Moon. Both these Moon pictures contain more detail than any I have seen; the latter especially brings the precipices, clefts, and valleys of the Apennines into striking prominence, on a scale which makes *Archimedes* $1\frac{3}{4}$ in. in diameter.

*Sydney Observatory:*
1892 *September* 17.

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## *The Motion of ζ Cancri.* By S. W. Burnham, M.A.

In a paper entitled "Invisible Double Stars" (*Monthly Notices*, April, 1891) I gave the result of an investigation of the observed positions of the star C of this system. From this it appeared that, while the observed places of this star were apparently arranged in somewhat regular groups, all of the stars of the same class which were examined showed the same tendency, and with about the same regularity. The question to be solved was whether this apparent want of uniformity in the motion of the star was to be ascribed to the disturbance produced by some unknown and invisible body, or to the ordinary errors of observation. While there is nothing, perhaps, improbable in the theory that non-luminous stars may exist throughout space, and may be components of binary systems, still it is at present a speculation at best, and it is obvious that it should be adopted as an explanation of actual observations only when the ordinary ways of accounting for apparent discordances have been positively shown to be insufficient. There would be less room for debate if *ζ Cancri* were the only example of this kind, but I have shown that in other stars, selected at random from those having an angular movement around their primaries of about the same

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